OIPE
JAN 26 2004
PATENT & TRADEMARK OFFICE
JC99

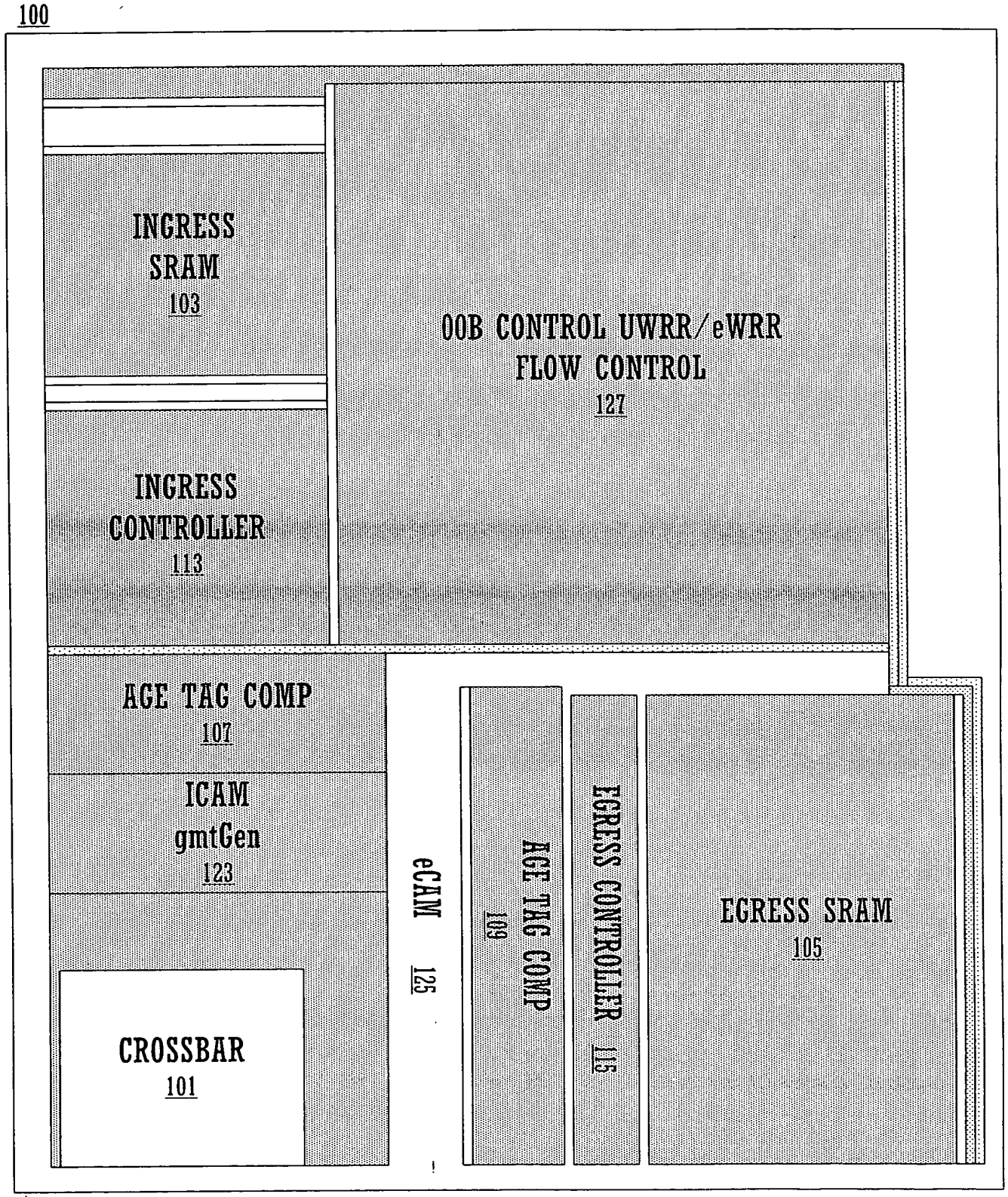


FIGURE 1

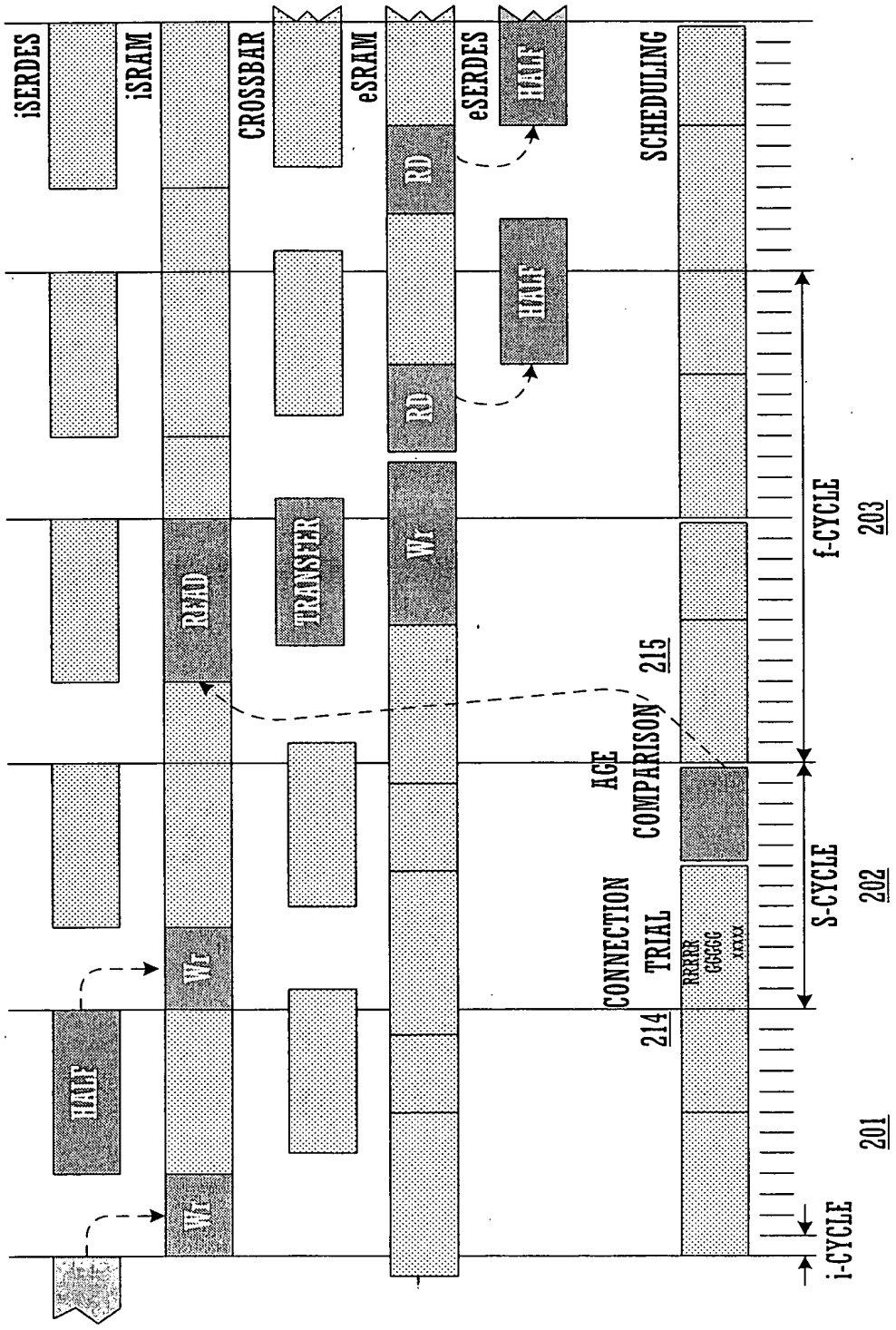

iSERDES
iSRAM
CROSSBAR
eSRAM
eSERDES
SCHEDULING
RD
WR
TRANSFER
CONNECTION TRIAL
AGE COMPARISON
215
214
f-CYCLE
203
S-CYCLE
202
i-CYCLE
201
200

FIGURE 2

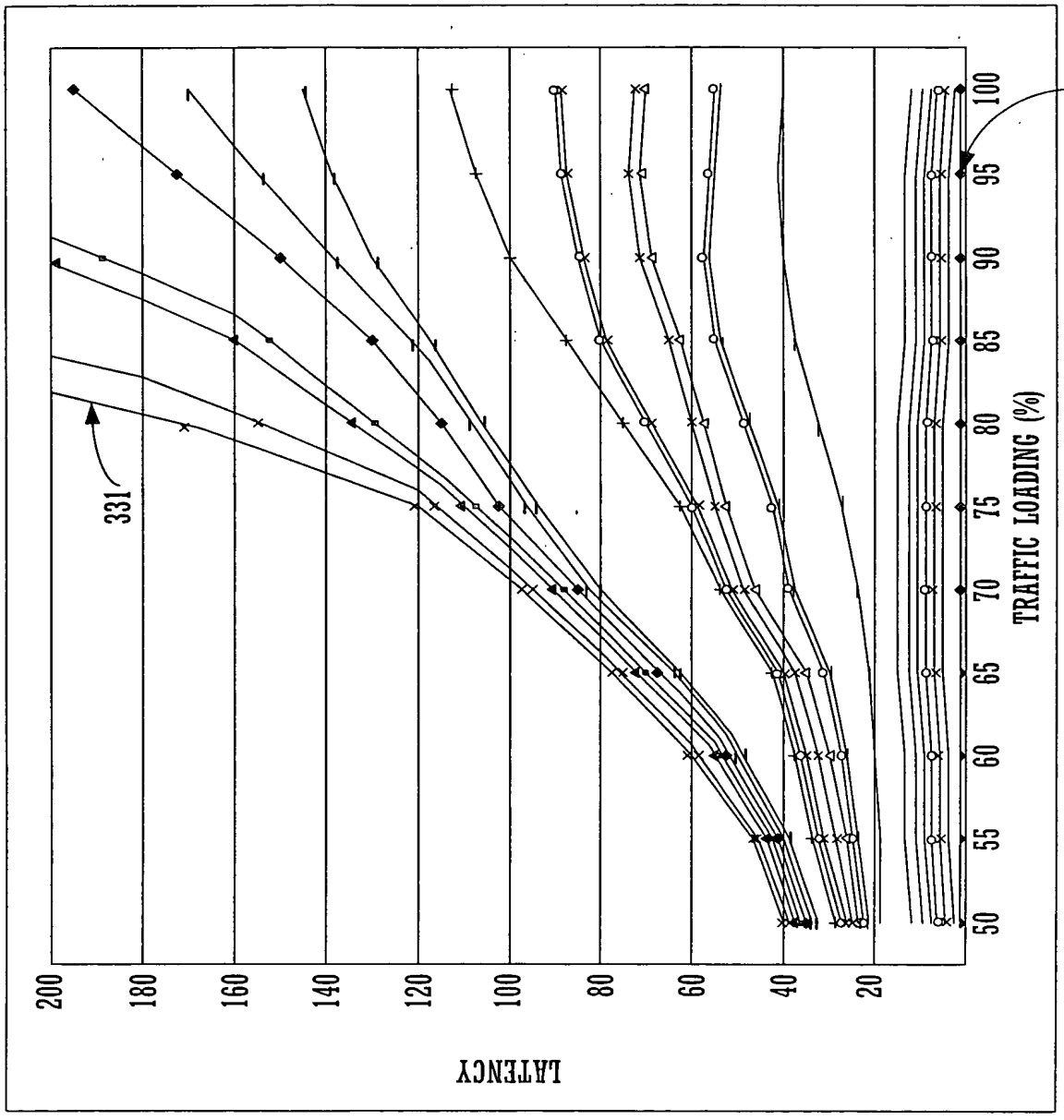

300
331
TRAFFIC LOADING (%)
50
55
60
65
70
75
80
85
90
95
100
LATENCY
200
180
160
140
120
100
80
60
40
20

FIGURE 3

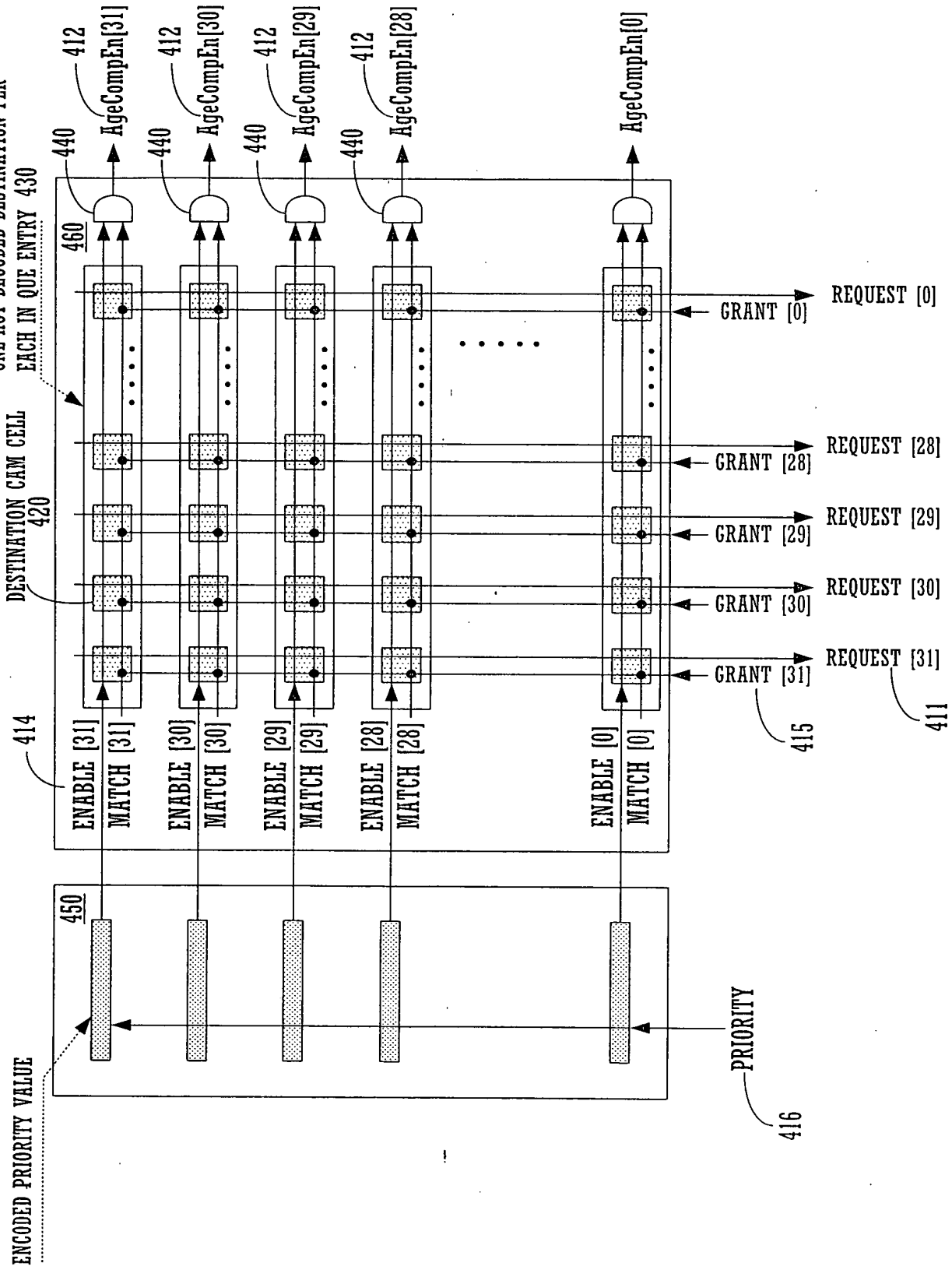

ONE-HOT DECODED DESTINATION PER EACH IN QUE ENTRY 430
DESTINATION CAM CELL 420
ENCODED PRIORITY VALUE
412
AgeCompEn[31]
AgeCompEn[30]
AgeCompEn[29]
AgeCompEn[28]
AgeCompEn[0]
440
460
450
414
ENABLE [31]
MATCH [31]
ENABLE [30]
MATCH [30]
ENABLE [29]
MATCH [29]
ENABLE [28]
MATCH [28]
ENABLE [0]
MATCH [0]
REQUEST [0]
GRANT [0]
REQUEST [28]
GRANT [28]
REQUEST [29]
GRANT [29]
REQUEST [30]
GRANT [30]
REQUEST [31]
GRANT [31]
411
415
PRIORITY
416

FIGURE 4A

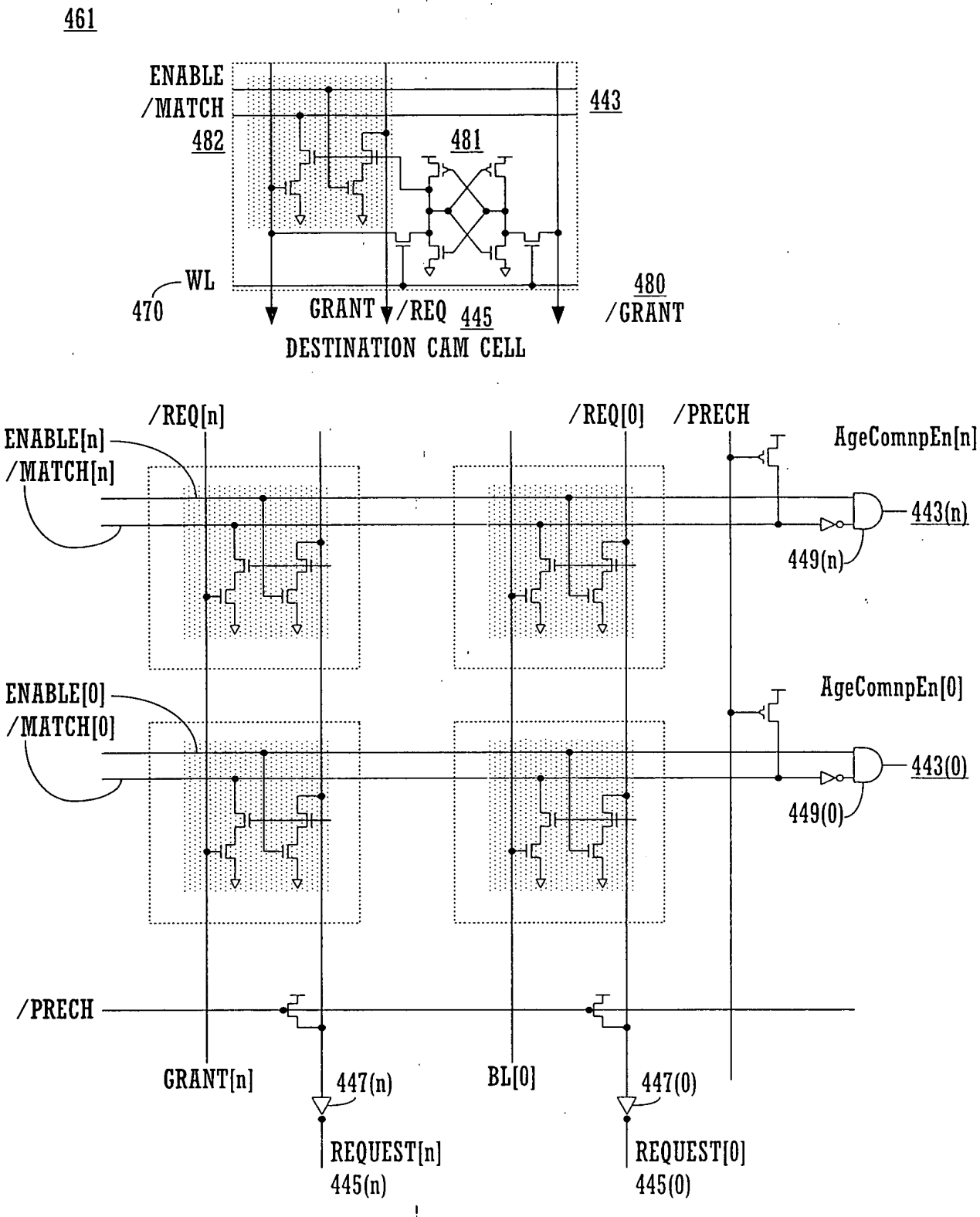

461
ENABLE
/MATCH
482
481
443
WL
470
GRANT
/REQ
445
480
/GRANT
DESTINATION CAM CELL
/REQ[n]
/REQ[0]
/PRECH
AgeComnpEn[n]
ENABLE[n]
/MATCH[n]
443(n)
449(n)
ENABLE[0]
/MATCH[0]
AgeComnpEn[0]
443(0)
449(0)
/PRECH
GRANT[n]
447(n)
BL[0]
447(0)
REQUEST[n]
445(n)
REQUEST[0]
445(0)

FIGURE 4B

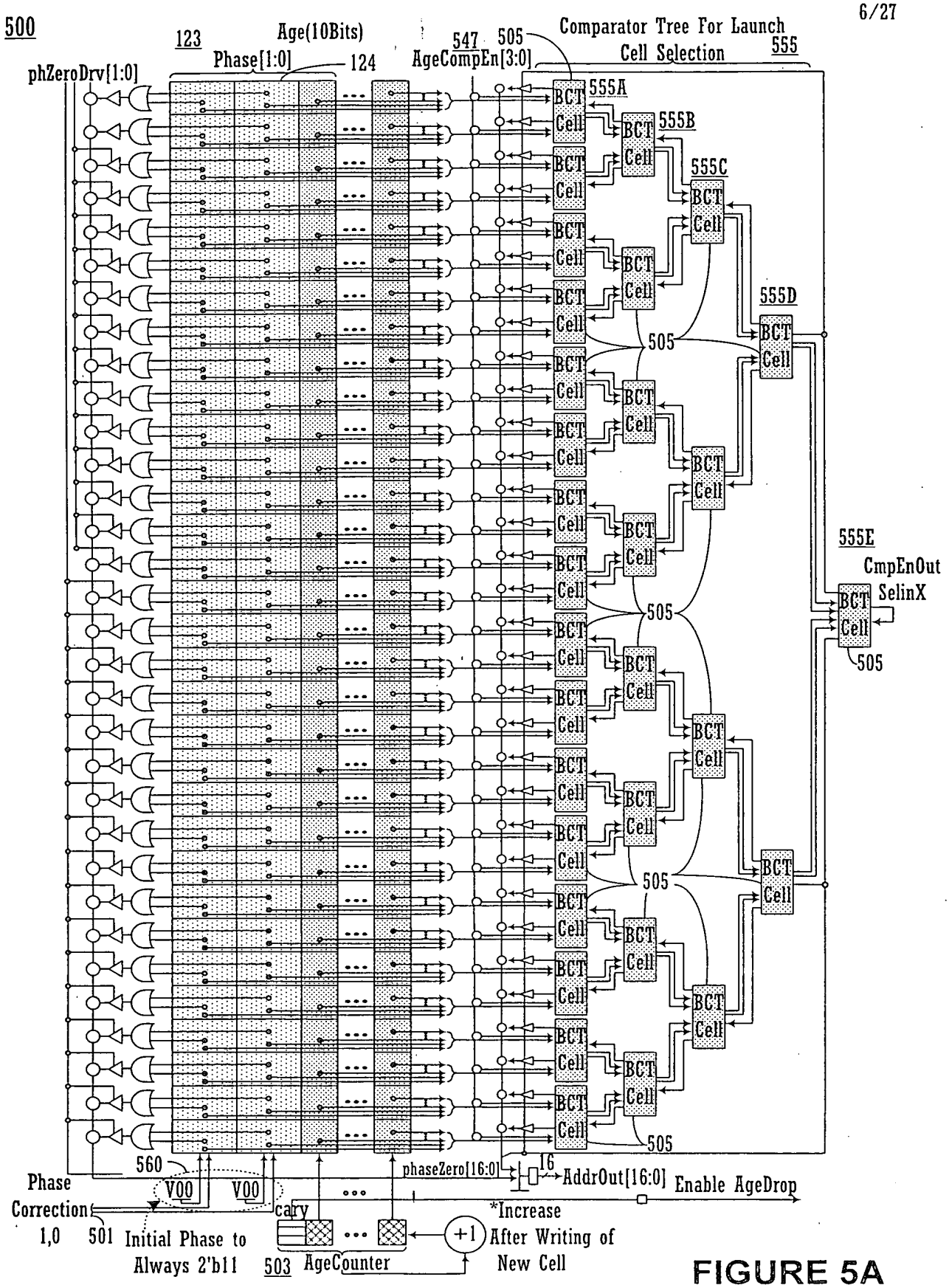

500
123
Age(10Bits)
Phase[1:0]
124
547
505
AgeCompEn[3:0]
Comparator Tree For Launch Cell Selection
555
phZeroDrv[1:0]
555A
555B
555C
555D
555E
BCT Cell
505
CmpEnOut
SelinX
560
VDD
VDD
phaseZero[16:0]
16
AddrOut[16:0]
Enable AgeDrop
Phase Correction
1,0
501
Initial Phase to Always 2'b11
carry
*Increase
+1
After Writing of New Cell
503
AgeCounter

FIGURE 5A

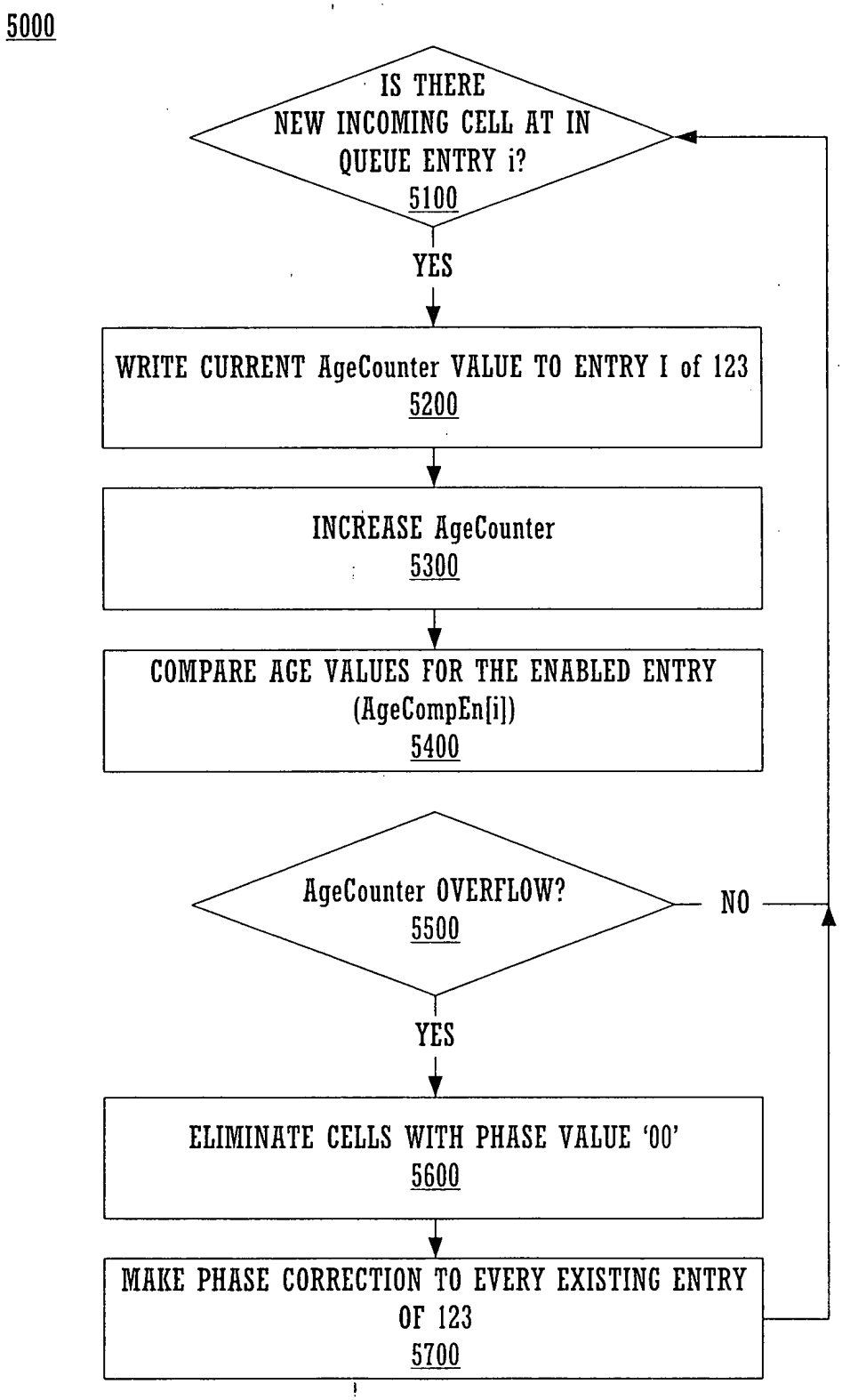
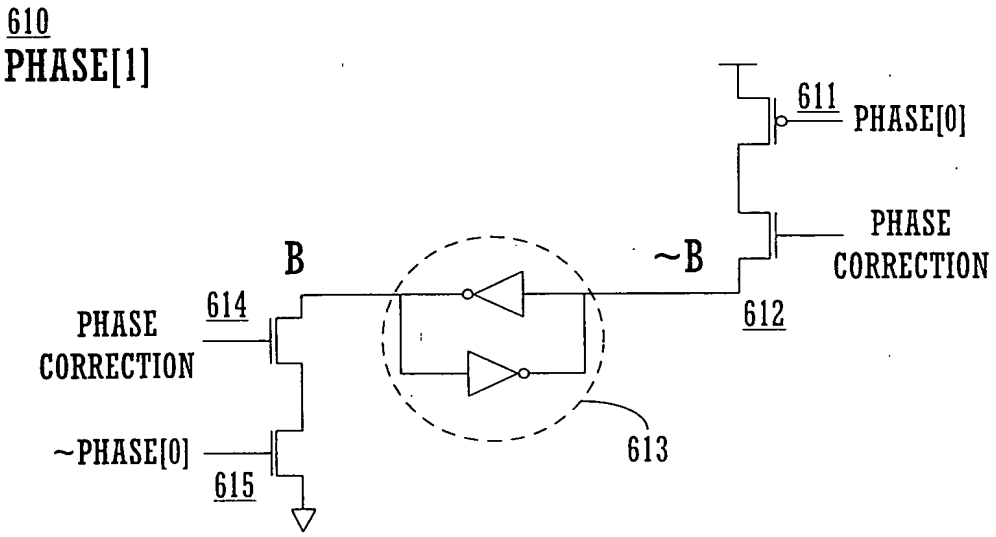

5000
IS THERE NEW INCOMING CELL AT IN QUEUE ENTRY i?
5100
YES
WRITE CURRENT AgeCounter VALUE TO ENTRY I of 123
5200
INCREASE AgeCounter
5300
COMPARE AGE VALUES FOR THE ENABLED ENTRY (AgeCompEn[i])
5400
AgeCounter OVERFLOW?
5500
NO
YES
ELIMINATE CELLS WITH PHASE VALUE '00'
5600
MAKE PHASE CORRECTION TO EVERY EXISTING ENTRY OF 123
5700

FIGURE 5B

PHASE CELL STRUCTURE FOR THREE STEP SELF ADJUSTMENT
(11 → 10 → 00 → INVALIDATE)



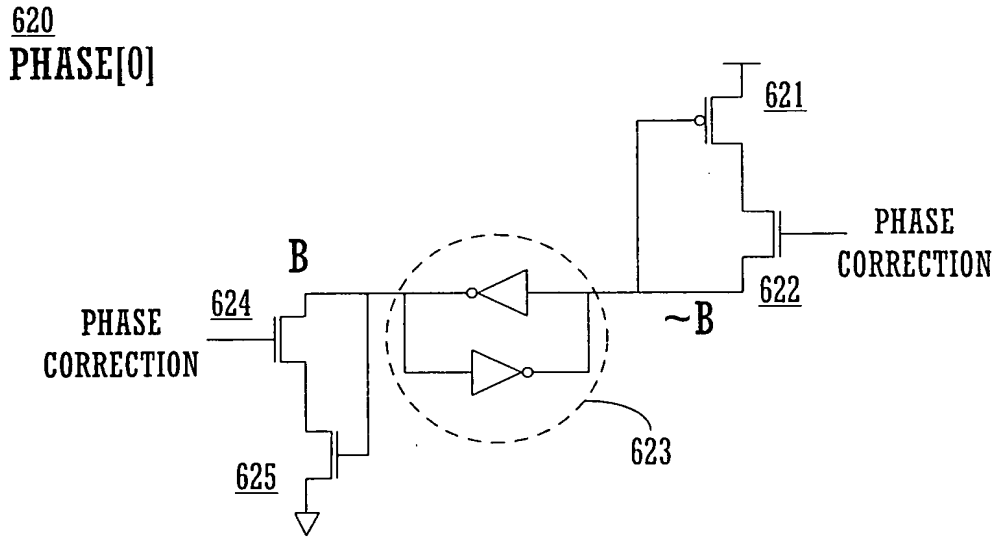


FIGURE 6

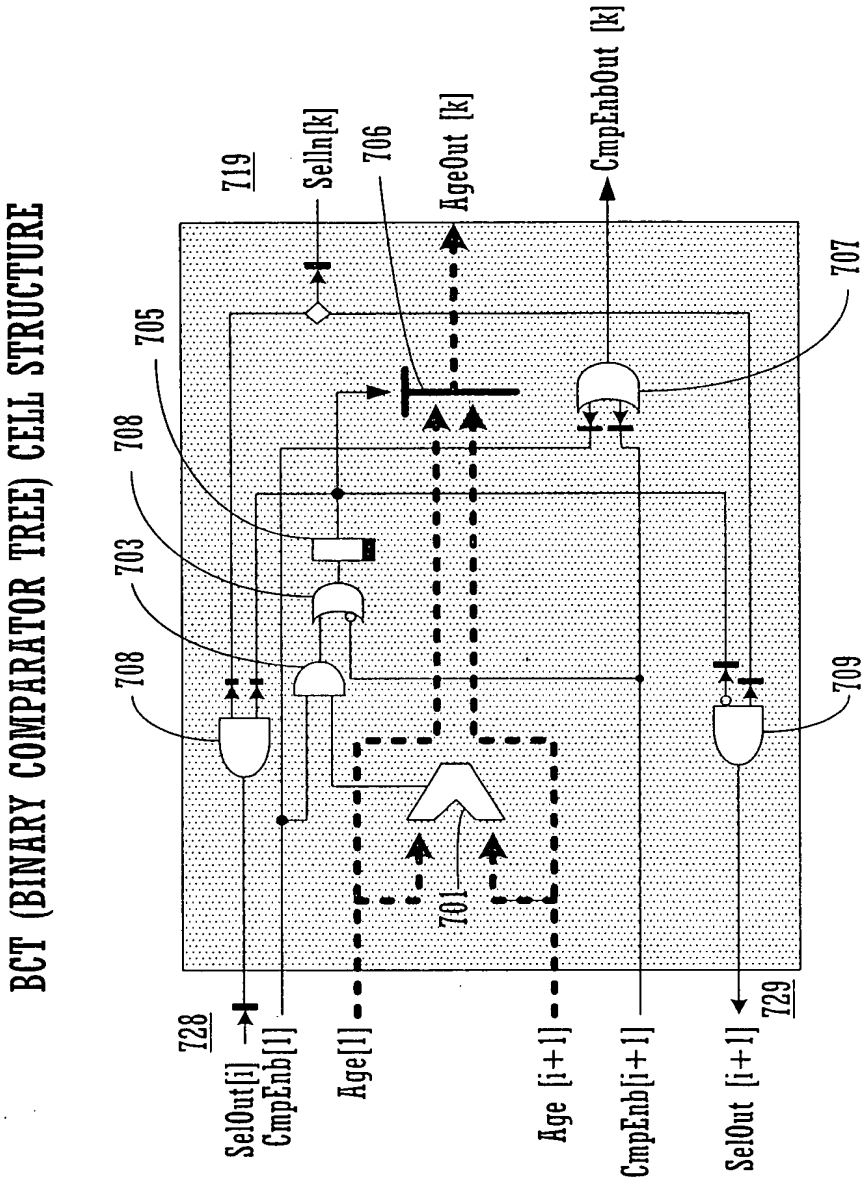

BCT (BINARY COMPARATOR TREE) CELL STRUCTURE
505
719
SelIn[k]
706
AgeOut [k]
CmpEnbOut [k]
707
705
708
703
708
709
701
728
729
SelOut[i]
CmpEnb[i]
Age[i]
Age [i+1]
CmpEnb[i+1]
SelOut [i+1]

FIGURE 7

1100

INTERLEAVED AGE-PRIORITY BASED SELECTION

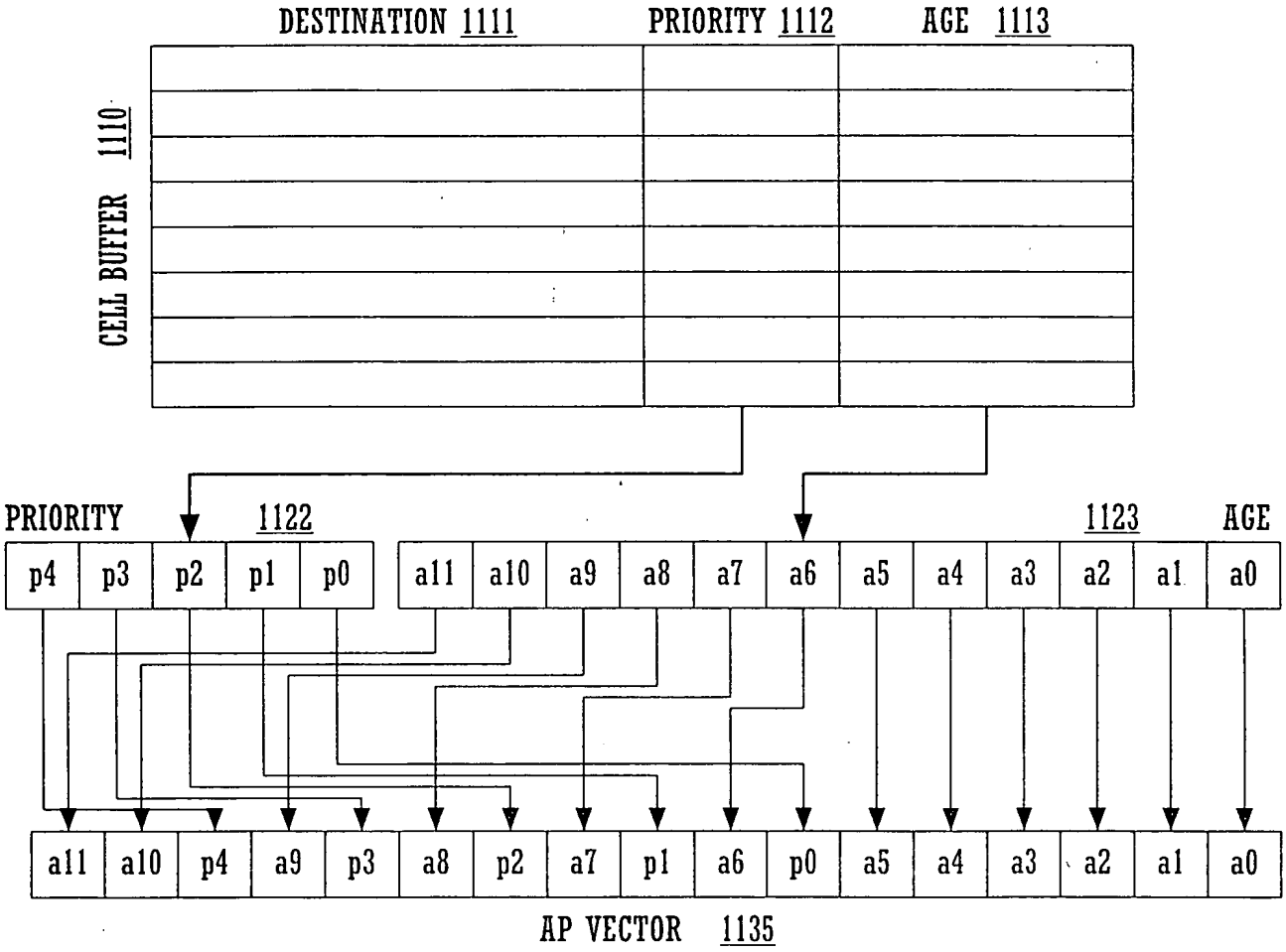


FIGURE 8

1200

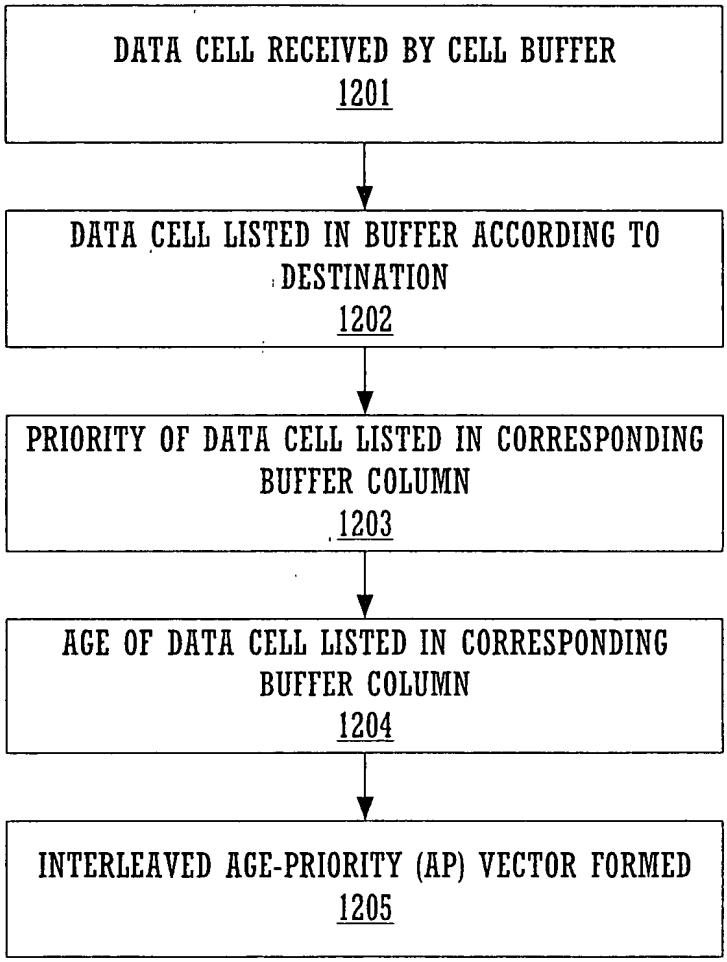


FIGURE 9

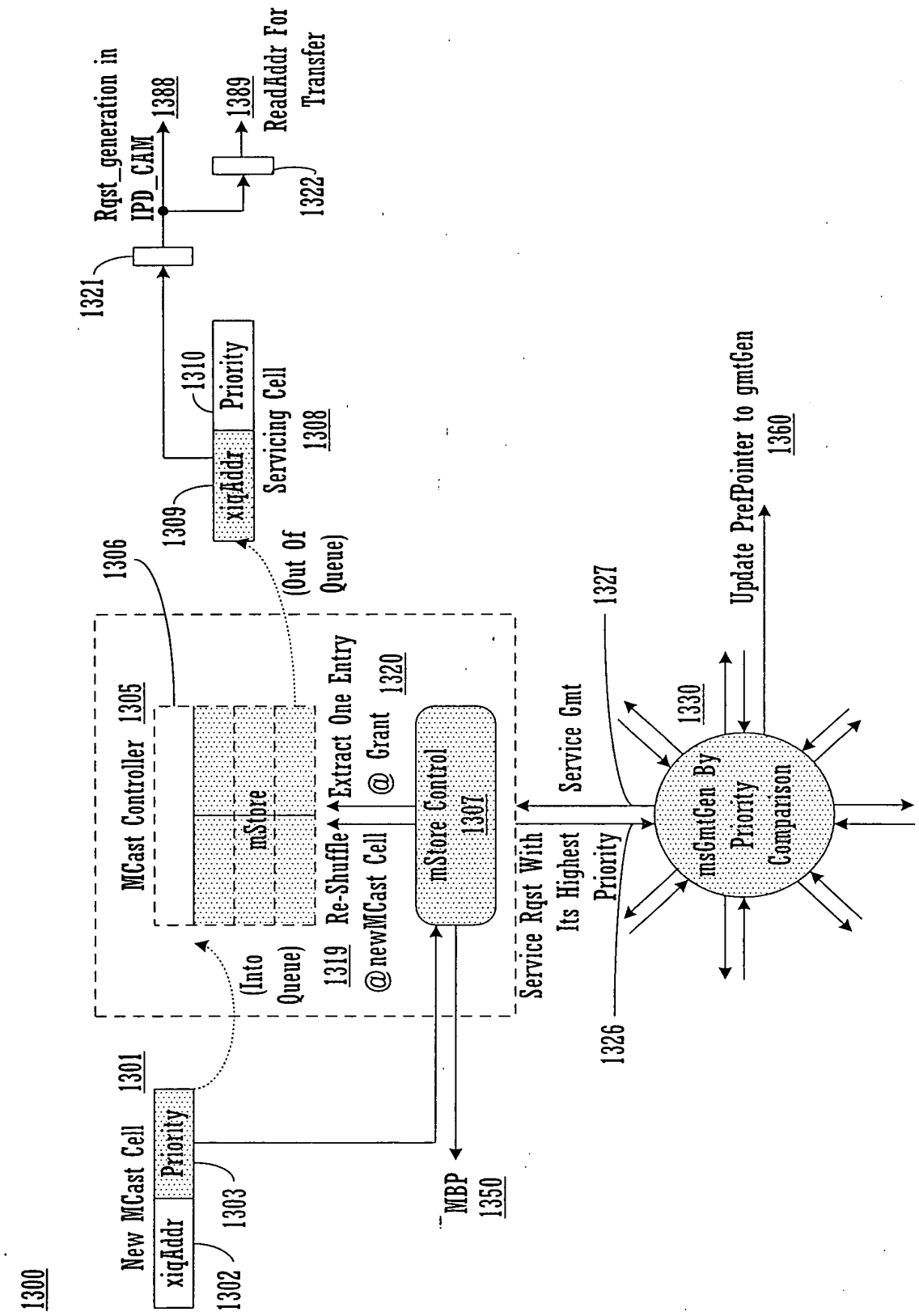

1300
New MCast Cell 1301
xiqAddr
Priority
1302
1303
MBP 1350
MCast Controller 1305
1306
(Into Queue) 1319
Re-Shuffle @newMCast Cell
Extract One Entry @ Grant 1320
mStore
mStore Control 1307
1309
xiqAddr
1310
Priority
Servicing Cell 1308
(Out Of Queue)
1321
Rqst_generation in IPD_CAM 1388
1322
1389
ReadAddr For Transfer
Service Rqst With Its Highest Priority
1326
Service Gnt
1327
1330
msGntGen By Priority Comparison
Update PrefPointer to gntGen 1360

FIGURE 10

1400

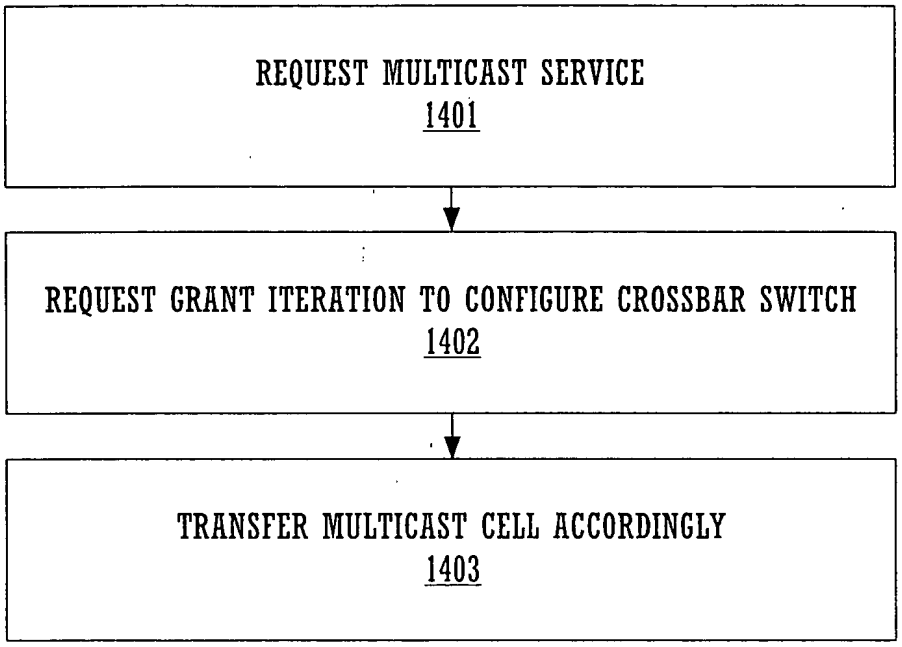


FIGURE 11A

1450

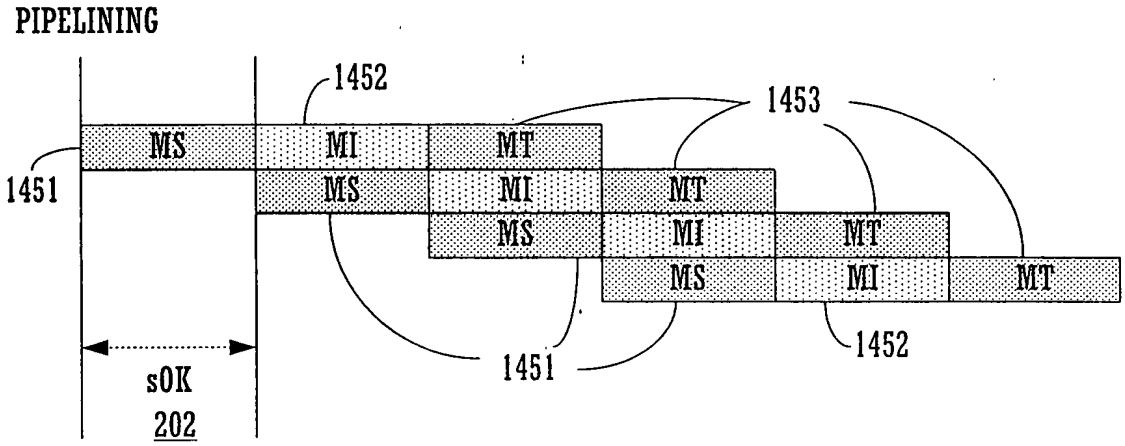


FIGURE 11B

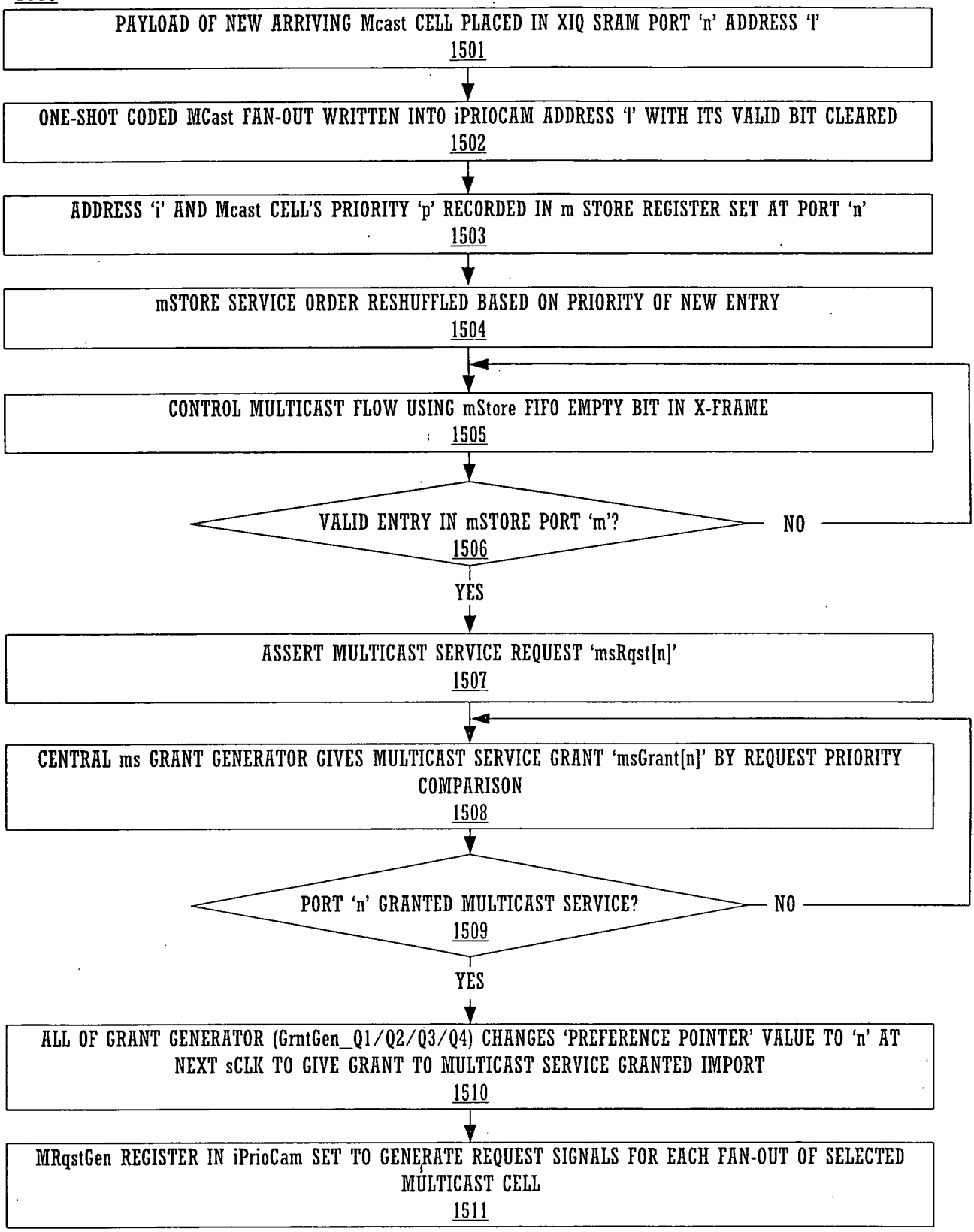

1500
PAYLOAD OF NEW ARRIVING Mcast CELL PLACED IN XIQ SRAM PORT 'n' ADDRESS 'I'
1501
ONE-SHOT CODED MCast FAN-OUT WRITTEN INTO iPRIOCAM ADDRESS 'I' WITH ITS VALID BIT CLEARED
1502
ADDRESS 'i' AND Mcast CELL'S PRIORITY 'p' RECORDED IN m STORE REGISTER SET AT PORT 'n'
1503
mSTORE SERVICE ORDER RESHUFFLED BASED ON PRIORITY OF NEW ENTRY
1504
CONTROL MULTICAST FLOW USING mStore FIFO EMPTY BIT IN X-FRAME
1505
VALID ENTRY IN mSTORE PORT 'm'?
1506
NO
YES
ASSERT MULTICAST SERVICE REQUEST 'msRqst[n]'
1507
CENTRAL ms GRANT GENERATOR GIVES MULTICAST SERVICE GRANT 'msGrant[n]' BY REQUEST PRIORITY COMPARISON
1508
PORT 'n' GRANTED MULTICAST SERVICE?
1509
NO
YES
ALL OF GRANT GENERATOR (GrntGen_Q1/Q2/Q3/Q4) CHANGES 'PREFERENCE POINTER' VALUE TO 'n' AT NEXT sCLK TO GIVE GRANT TO MULTICAST SERVICE GRANTED IMPORT
1510
MRqstGen REGISTER IN iPrioCam SET TO GENERATE REQUEST SIGNALS FOR EACH FAN-OUT OF SELECTED MULTICAST CELL
1511

FIGURE 12

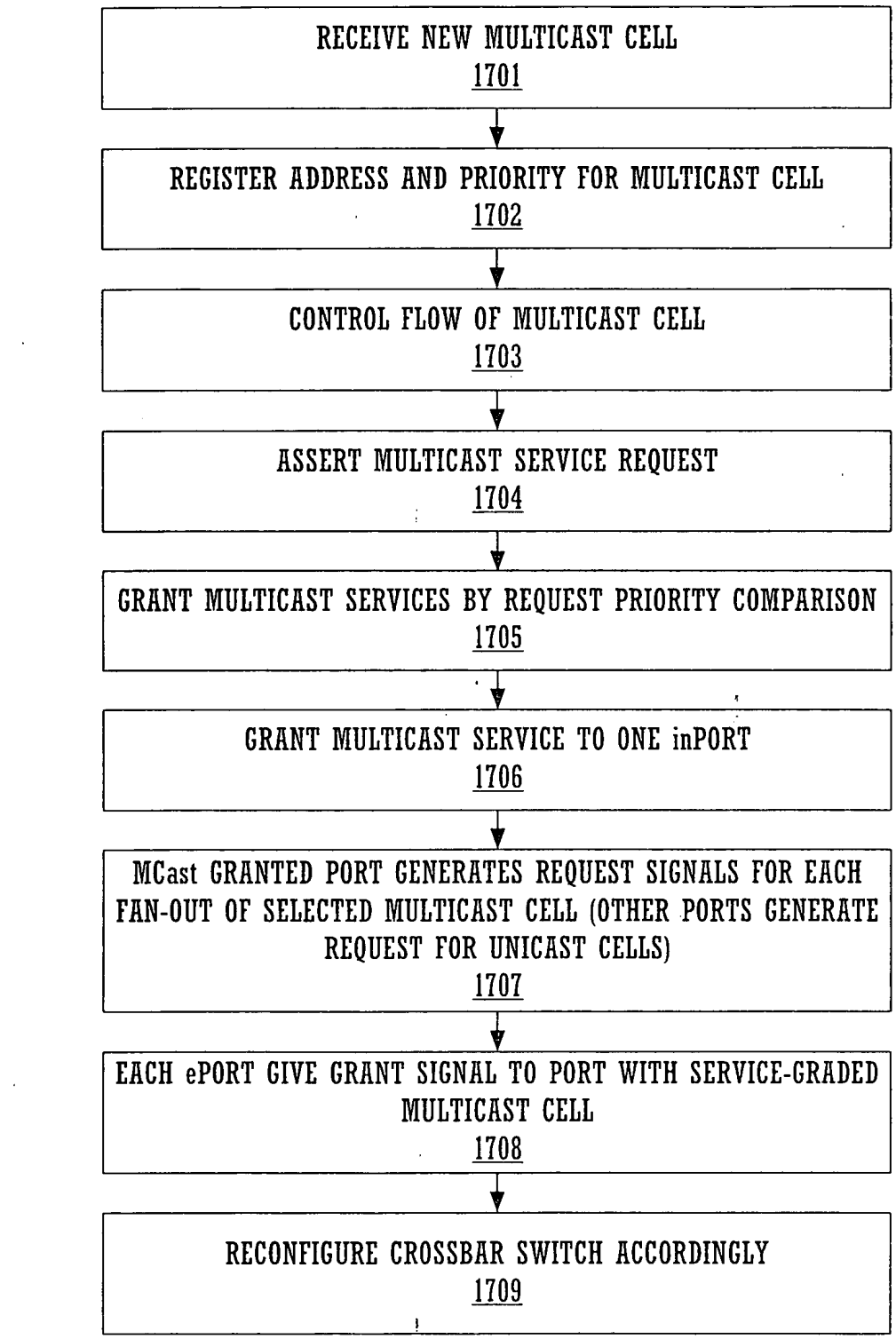

1700
RECEIVE NEW MULTICAST CELL
1701
REGISTER ADDRESS AND PRIORITY FOR MULTICAST CELL
1702
CONTROL FLOW OF MULTICAST CELL
1703
ASSERT MULTICAST SERVICE REQUEST
1704
GRANT MULTICAST SERVICES BY REQUEST PRIORITY COMPARISON
1705
GRANT MULTICAST SERVICE TO ONE inPORT
1706
MCast GRANTED PORT GENERATES REQUEST SIGNALS FOR EACH FAN-OUT OF SELECTED MULTICAST CELL (OTHER PORTS GENERATE REQUEST FOR UNICAST CELLS)
1707
EACH ePORT GIVE GRANT SIGNAL TO PORT WITH SERVICE-GRADED MULTICAST CELL
1708
RECONFIGURE CROSSBAR SWITCH ACCORDINGLY
1709

FIGURE 13

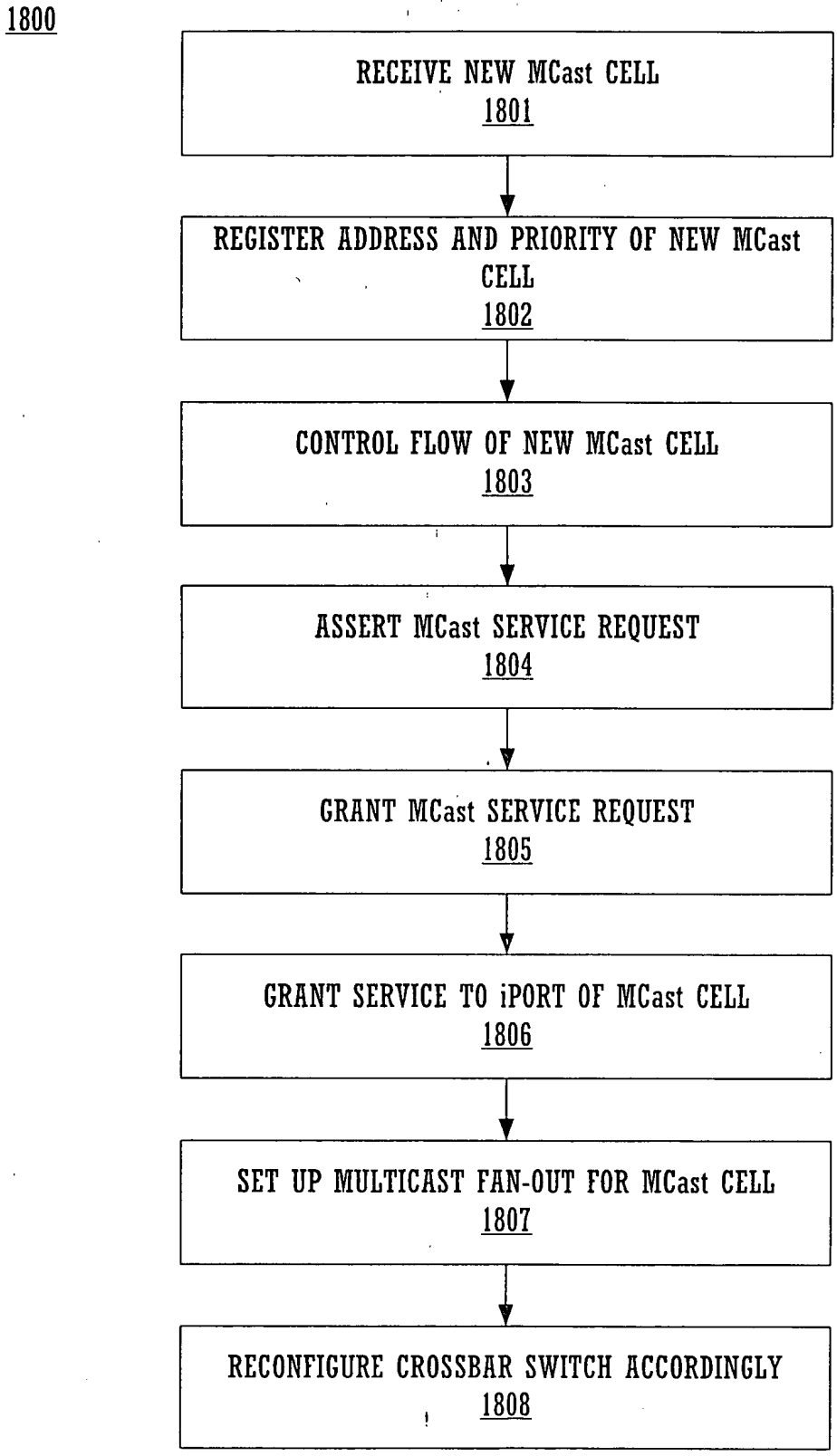
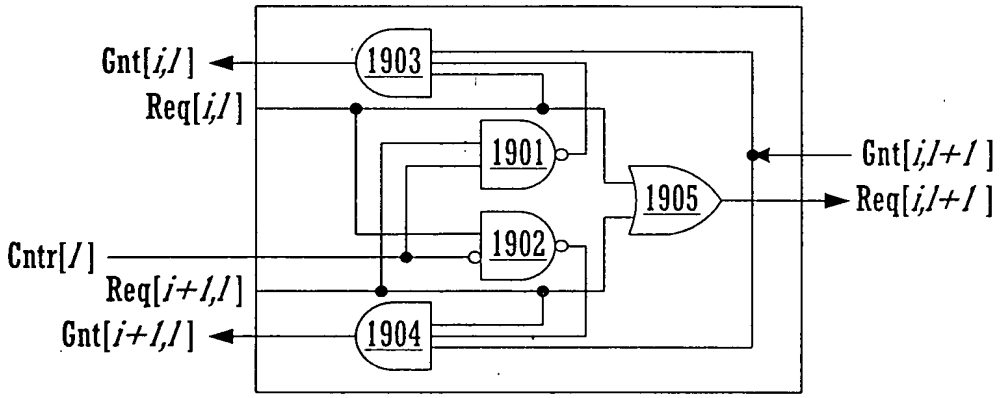

1800
RECEIVE NEW MCast CELL
1801
REGISTER ADDRESS AND PRIORITY OF NEW MCast CELL
1802
CONTROL FLOW OF NEW MCast CELL
1803
ASSERT MCast SERVICE REQUEST
1804
GRANT MCast SERVICE REQUEST
1805
GRANT SERVICE TO iPORT OF MCast CELL
1806
SET UP MULTICAST FAN-OUT FOR MCast CELL
1807
RECONFIGURE CROSSBAR SWITCH ACCORDINGLY
1808

FIGURE 14

1900

Sig[*i*,*l*] : *i*-th SIGNAL AT LEVEL *l*



BRRT CELL

FIGURE 15

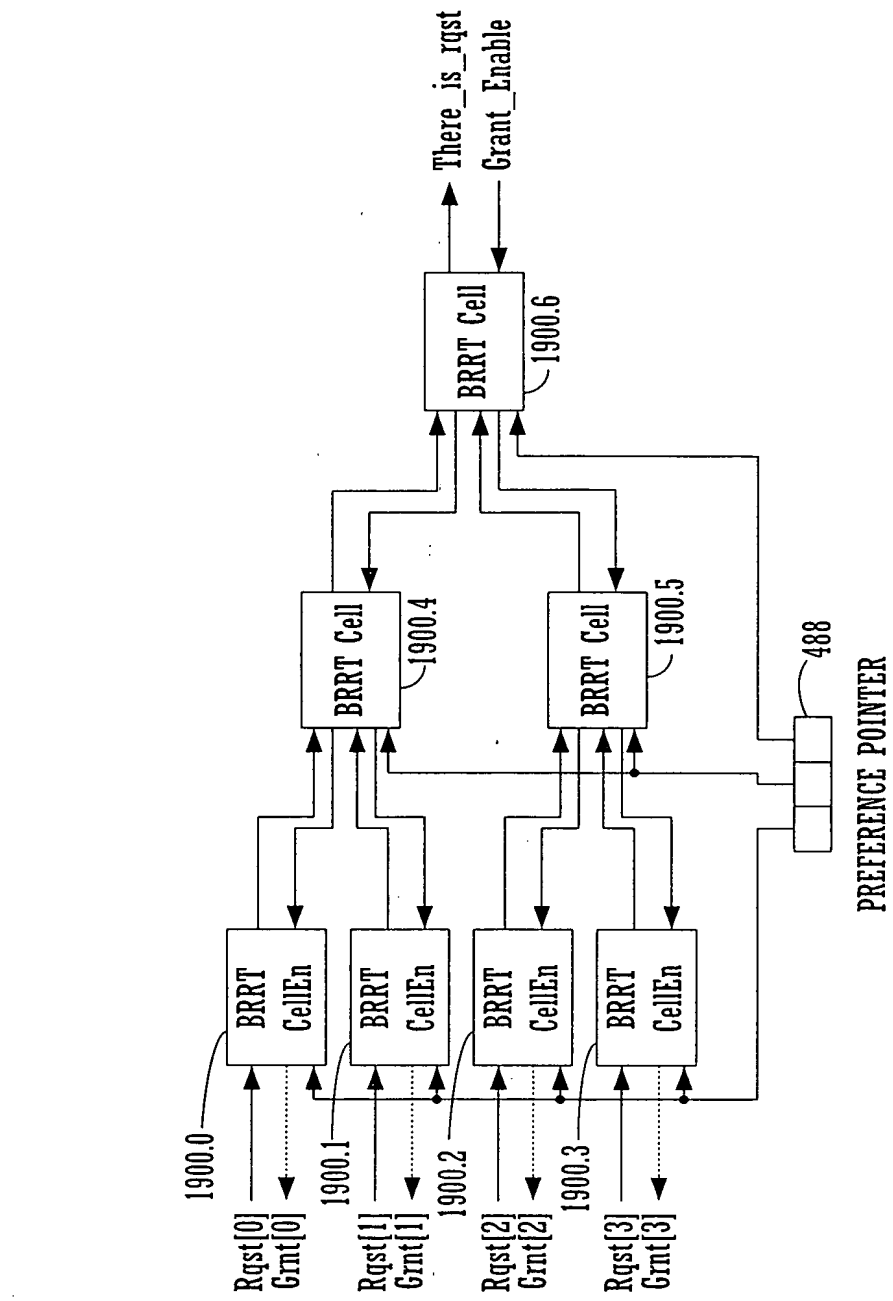

There_is_rqst
Grant_Enable
BRRT Cell
1900.6
BRRT Cell
1900.4
BRRT Cell
1900.5
488
PREFERENCE POINTER
BRRT CellEn
BRRT CellEn
BRRT CellEn
BRRT CellEn
1900.0
1900.1
1900.2
1900.3
Rqst[0]
Grnt[0]
Rqst[1]
Grnt[1]
Rqst[2]
Grnt[2]
Rqst[3]
Grnt[3]
2000

FIGURE 16A

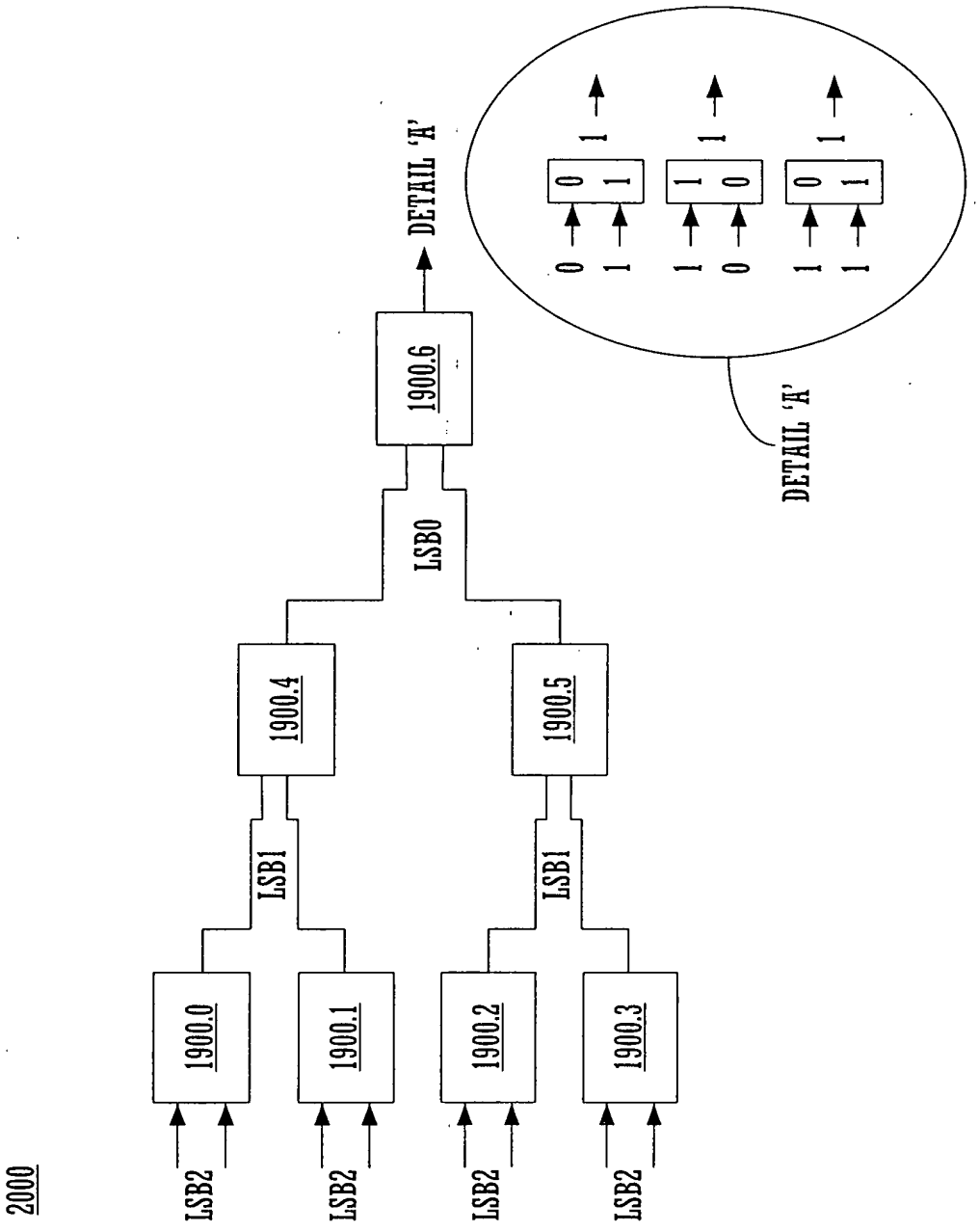

2000
LSB2
LSB2
LSB2
LSB2
1900.0
1900.1
1900.2
1900.3
LSB1
LSB1
1900.4
1900.5
LSB0
1900.6
DETAIL 'A'
DETAIL 'A'
0
1
1
0
1
1
0
1
1
0
1
1
0
1
1
0
1
1

FIGURE 16B

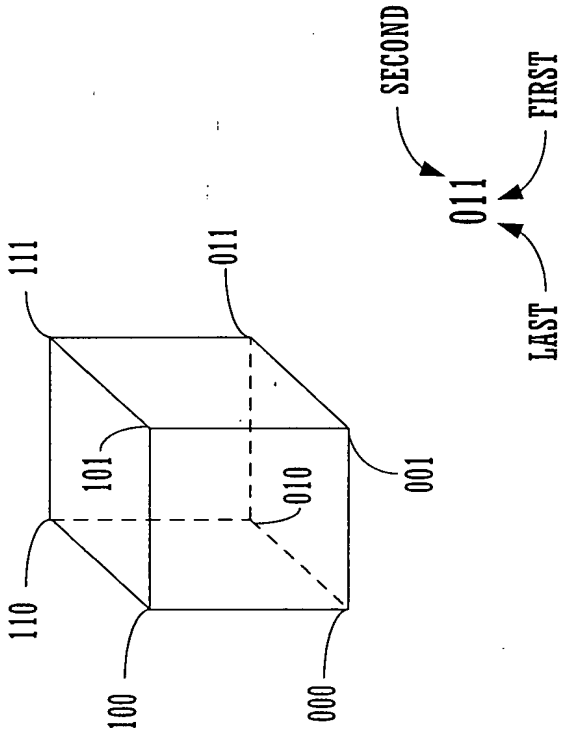


FIGURE 16C

1900.21

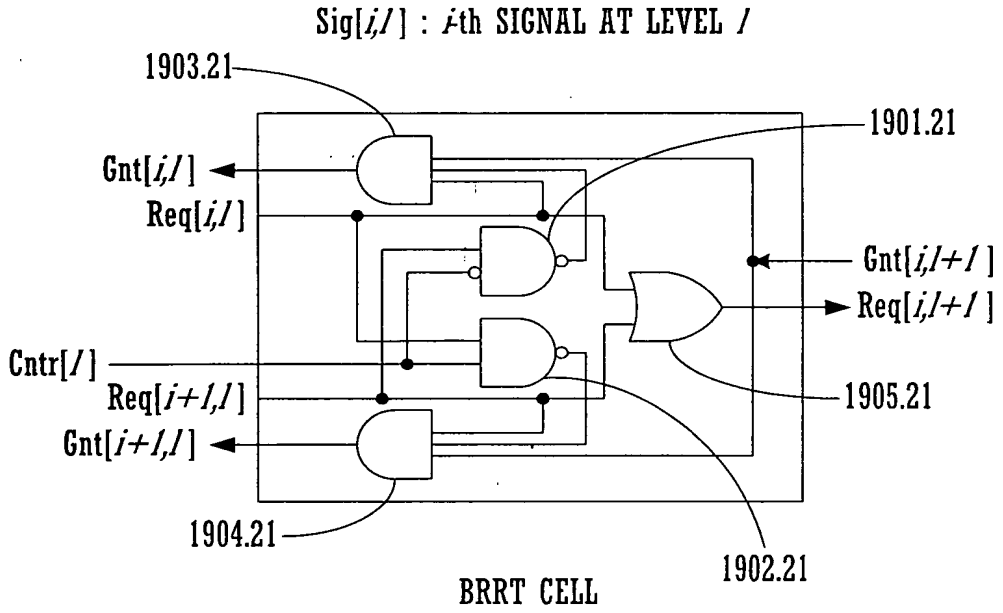
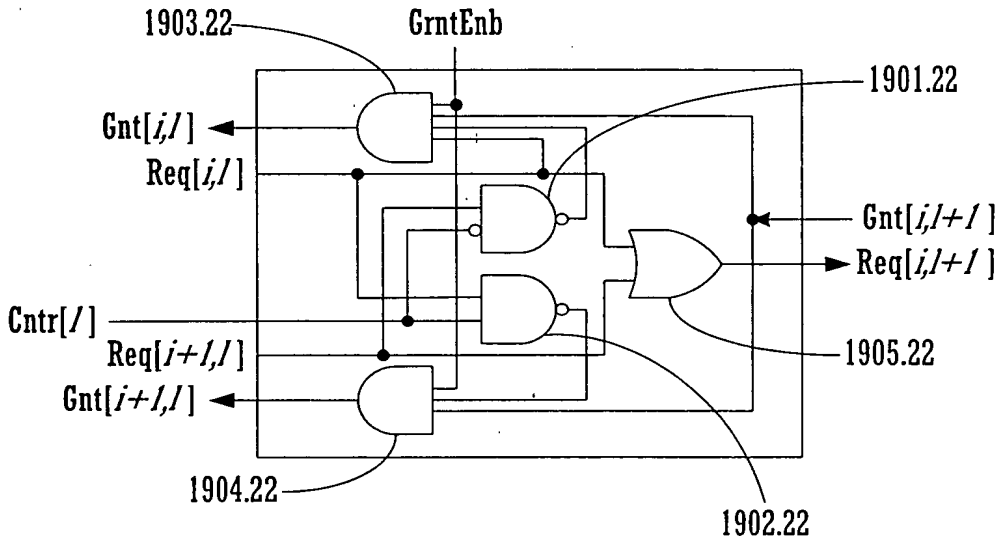


FIGURE 17

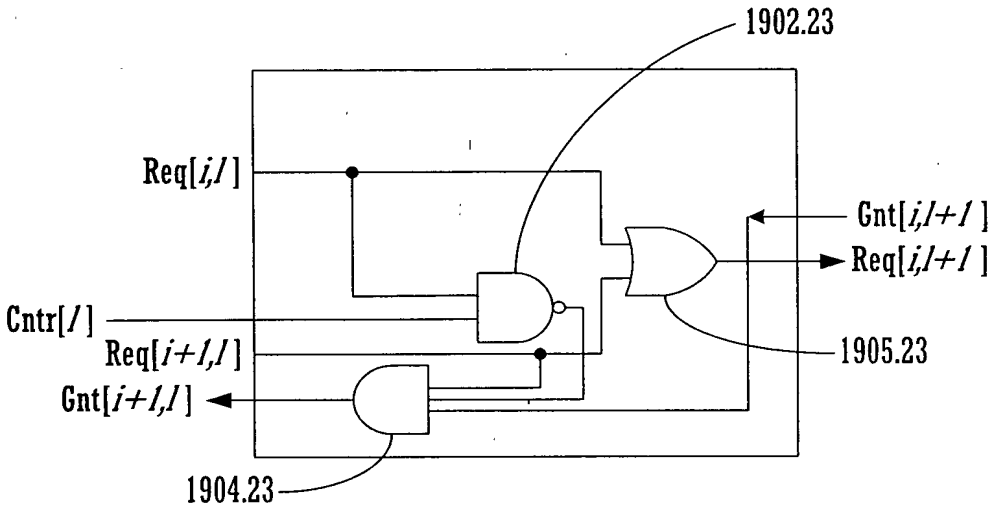
1900.22



BRRT CELL WITH ENABLE

FIGURE 18

1900.23



BRRT CELL WITH SINGLE GRANT

FIGURE 19

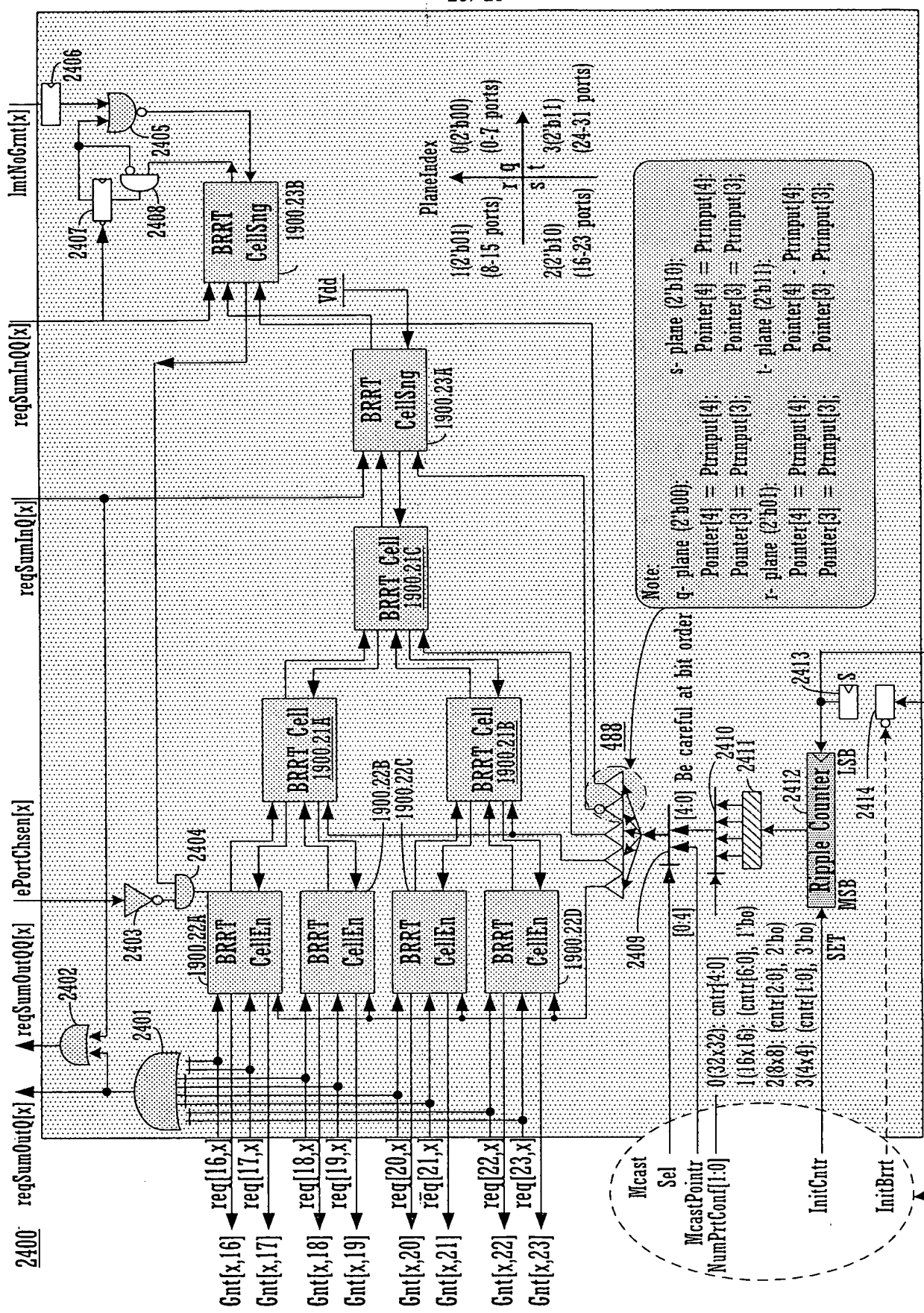

2400
reqSumOutQ[x]
reqSumOutQQ[x]
ePortChsen[x]
reqSumInQ[x]
reqSumInQQ[x]
lmtNoGmt[x]
2401
2402
2403
2404
2405
2406
2407
2408
BRRT CellSng 1900.23B
BRRT CellSng 1900.23A
BRRT Cell 1900.21C
BRRT Cell 1900.21A
BRRT Cell 1900.21B
BRRT CellEn 1900.22A
BRRT CellEn 1900.22B
BRRT CellEn 1900.22C
BRRT CellEn 1900.22D
Vdd
PlaneIndex
0(2'b00) (0-7 ports)
1(2'b01) (8-15 ports)
2(2'b10) (16-23 ports)
3(2'b11) (24-31 ports)
r q s t
Note:
q- plane (2'b00): Pointer[4] = Ptrinput[4]; Pointer[3] = Ptrinput[3];
r- plane (2'b01): Pointer[4] = Ptrinput[4]; Pointer[3] = Ptrinput[3];
s- plane (2'b10): Pointer[4] = Ptrinput[4]; Pointer[3] = Ptrinput[3];
t- plane (2'b11): Pointer[4] = Ptrinput[4]; Pointer[3] = Ptrinput[3];
488
2409
[4:0] Be careful at bit order
[0:4]
2410
2411
2412
2413
2414
Ripple Counter
SET
MSB
LSB
S
ePort ChsenDly[x]
ePort Chsen[x]
0(32x32): cntr[4:0]
1(16x16): {cntr[6:0], 1'b0}
2(8x8): {cntr[2:0], 2'b0}
3(4x4): {cntr[1:0], 3'b0}
Mcast
Sel
McastPointr
NumPrtConf[1:0]
InitCntr
InitBrrt
Global to all @Brrt
req[16,x]
req[17,x]
req[18,x]
req[19,x]
req[20,x]
req[21,x]
req[22,x]
req[23,x]
Gnt[x,16]
Gnt[x,17]
Gnt[x,18]
Gnt[x,19]
Gnt[x,20]
Gnt[x,21]
Gnt[x,22]
Gnt[x,23]

FIGURE 20

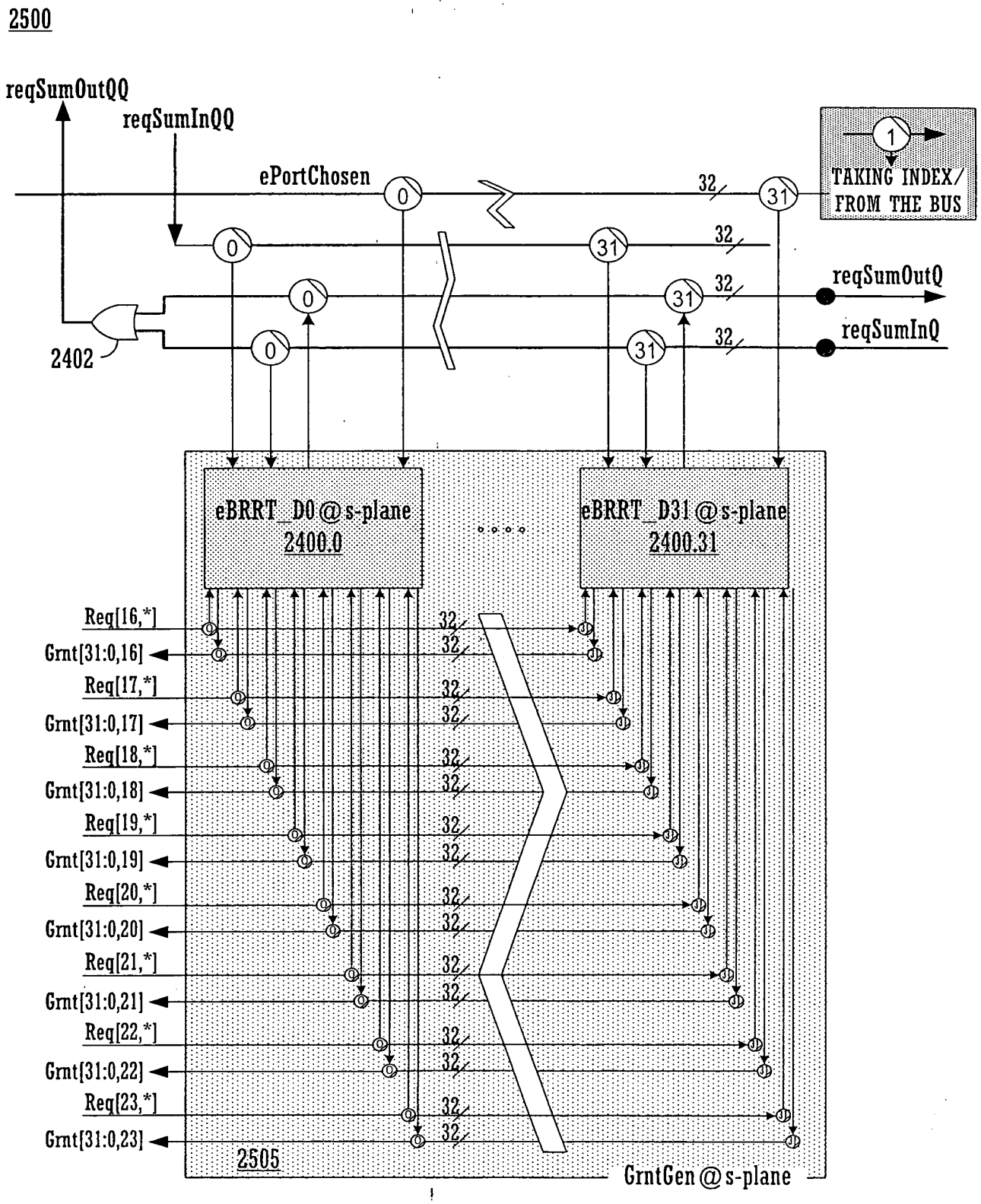

2500
reqSumOutQQ
reqSumInQQ
ePortChosen
TAKING INDEX/ FROM THE BUS
reqSumOutQ
reqSumInQ
2402
eBRRT_D0@s-plane 2400.0
eBRRT_D31@s-plane 2400.31
Req[16,*]
Grnt[31:0,16]
Req[17,*]
Grnt[31:0,17]
Req[18,*]
Grnt[31:0,18]
Req[19,*]
Grnt[31:0,19]
Req[20,*]
Grnt[31:0,20]
Req[21,*]
Grnt[31:0,21]
Req[22,*]
Grnt[31:0,22]
Req[23,*]
Grnt[31:0,23]
2505
GrntGen@s-plane

FIGURE 21

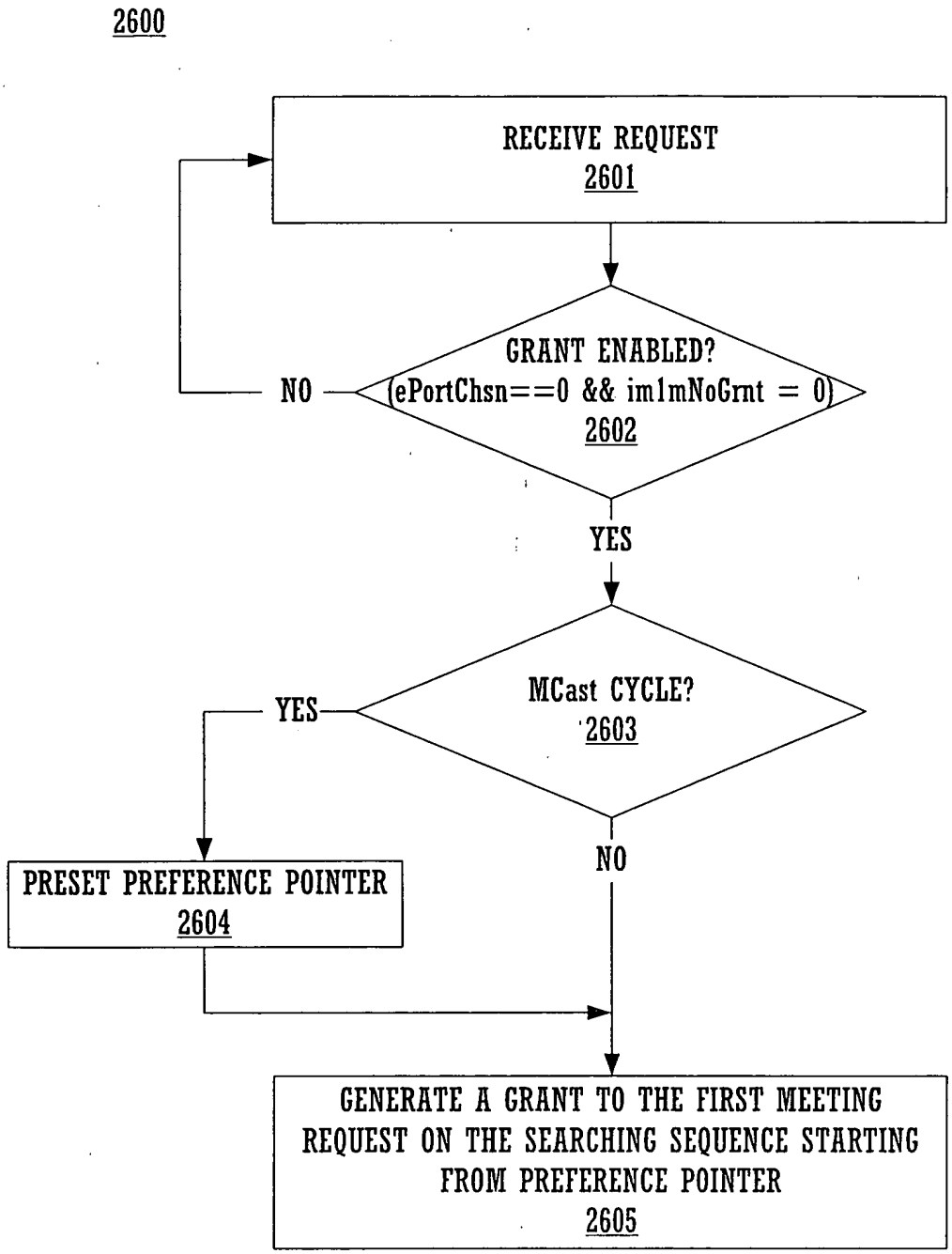

2600
RECEIVE REQUEST
2601
GRANT ENABLED?
(ePortChsn==0 && im1mNoGrnt = 0)
2602
NO
YES
MCast CYCLE?
2603
YES
NO
PRESET PREFERENCE POINTER
2604
GENERATE A GRANT TO THE FIRST MEETING REQUEST ON THE SEARCHING SEQUENCE STARTING FROM PREFERENCE POINTER
2605

FIGURE 22